

## SHUSAKU YAMAMOTO

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## Specification

1. Title of the Invention  
Information transfer system

2. Claim

An information transfer system for performing data transfer and a telephone call using a common transfer line, wherein while a telephone call is not being made, data is transferred via a first channel having an arbitrary frequency having little loss on the transfer line; and while a telephone call is being made, the telephone call is made via a second channel in a frequency band enabling a telephone call and also data is transferred in a third channel outside the frequency range of the second channel.

3. Detailed Description of the Invention  
[Field of the Invention]

The present invention relates to an information transfer system for simultaneously performing data transfer and a telephone call using a information transfer line.

[Prior Art]

## SHUSAKU YAMAMOTO

Appln. 2000-516470

Your Reference: 081513-31

A conventional information transfer system will be described with reference to Figure 1. In Figure 1, A is a line connection circuit, B is a modulation and demodulation circuit, C is an input/output circuit, D is a calling circuit, and E is a calling/switching circuit. Figure 1 shows a case where two stations having an identical structure including these elements are connected to each other via a transfer line. Reference numeral 1 is a divider, 2 is a hybrid coil, 3 is an amplifier for receiving, 4 is a band pass filter for receiving, 5 is a demodulator, 6 is an amplifier for transmitting, 7 is a band pass filter for transmitting, 8 is a modulator, 9 and 10 are low pass filters for telephone calls, 11 is an amplifier for calling, 12 is a speaker for calling, and 13 is a transmitter/receiver.

Next, an operation of the conventional system will be described. In Figure 1, a received signal, among transmitted and received signals, is sent via the divider 1 from the line and distributed by the hybrid coil 2. Then, the signal is amplified to a necessary level by the amplifier 3. From the amplified signal, only a necessary data signal is extracted by the band pass filter 4, and the extracted signal is demodulated by the demodulator 5. The demodulated signal is sent to the output circuit. A transmitted signal from the input circuit is modulated by the modulator 8 and sent through the band pass filter 7. The signal is then amplified to a necessary level by the amplifier 6. The amplified signal is coupled to a line by the hybrid coil 2, and sent out via the divider 1.

A received signal (or received calling signal), among telephone call signals, is processed in a similar manner to the case of data transfer. The received signal is sent from

## SHUSAKU YAMAMOTO

Appln. 2000-516470

Your Reference: 081513-31

the line via the divider 1, the hybrid coil 2, and the amplifier 3. From the signal, only a component having a voice frequency (1800 Hz or lower) is allowed to pass the low pass filter 9, and the resultant signal is amplified by the amplifier 11. The amplified signal causes the speaker 12 and a receiver (R) of the transmitter/receiver 13 to sound. An input voice from a transmitter T of the transmitter/receiver 13 has a high frequency component (1800 Hz or higher) cut therefrom by the low pass filter 10, and the resultant signal is amplified to a necessary level by the amplifier 6. The amplified signal is coupled to the line by the hybrid coil 2 and sent out via the divider 1.

The frequency of the data transfer channel is set to be 1800 Hz or higher and the voice frequency is set to be 1800 Hz or lower. Therefore, data transfer and telephone calls can be performed simultaneously via the transfer line of the voice band frequency (300 to 3400 Hz).

As described above, in the conventional system, data transfer needs to be performed in a high band (1800 Hz or higher) even when the telephone calls are not necessary. Therefore, the conventional system has a defect that, for example, data transfer cannot be performed with certainty in the case, for example, where transfer line loss is large.

## [Overview of the Invention]

The present invention is made to eliminate such a defect of the conventional system and has an objective of providing an information transfer system for switching the data transfer channel to a channel outside the band for telephone calls (1800 Hz or higher) only when making a telephone call, so that data transfer can be continuously performed even

## SHUSAKU YAMAMOTO

Appln. 2000-516470

Your Reference: 081513-31

while a telephone call is made, and for using a channel having little loss on the transfer line as the data transfer channel when telephone calls are not necessary, so that secure data transfer can be realized.

[Examples of the Invention]

Hereinafter, an example of the present invention will be described with reference to the drawings. In Figure 2, A through C and 1 through 13 are similar to those in Figure 1. Reference numerals 14 and 15 are a band pass filter and a demodulator for receiving for the non-telephone call operation (referred to as the "normal operation"), 17 and 18 are a band pass filter and a modulator for transmitting for the normal operation. Reference numeral 21 is a transmitting channel switching relay actuated by a hook switch 22, and 23 is a carrier detection relay for calling.

During the normal operation (non-telephone call operation), a transmitted signal, among data transfer signals, is processed as follows. Only a component of the transmitted signal input by the input circuit and modulated by the modulator 18 for the normal operation is sent to the amplifier 18 via the band pass filter 17 and a relay contact 21a, and is amplified to a necessary level by the amplifier 6. The amplified signal is coupled to the line via the hybrid coil 2, and sent out via the divider 1. A received signal is input to the band pass filters 4 and 14 via the hybrid coil 2 and the amplifier 3. A signal for the normal operation only passes the band pass filter 14, and is demodulated by the demodulator 15 for the normal case. The signal is then sent to the output circuit. The channel frequency of the modulator and the demodulator is an arbitrary frequency having little loss on the transfer line.

## SHUSAKU YAMAMOTO

Appln. 2000-516470

Your Reference: 081513-31

In the case of a telephone call, the transmitter 13 is lifted on the calling side, thereby closing the hook switch 22 and actuating the relay 21. Thus, the transmitting channel of the data transfer is switched from the modulator 18 to the modulator 8. The signal passes the band pass filter 7 and is amplified to a necessary level by the amplifier 6. The amplified signal is sent out via the hybrid coil 2 and the divider 1. On the receiving side, the received signal is input to the band pass filters 4 and 14 via the divider 1, the hybrid coil 2, and the amplifier 3. Since the transmitting channel is switched, the signal passes only the band pass filter 4. The signal is then demodulated by the demodulator and sent to the output circuit. Simultaneously, the relay 23 is actuated by the carrier detection by the demodulator 5, thereby closing a contact 23a. Thus, a telephone call path is formed. Since the data transfer channel frequency is 1800 Hz or higher, telephone calls at a frequency equal to or lower than 1800 Hz is made possible. After the telephone call is finished, the transmitter/receiver is put in place, thereby opening the hook switch and recovering the relay 23. Thus, the operation returns to the normal operation.

The above example is of a bidirectional communication information transfer system, but the present invention provides a similar effect also for a monodirectional communication information transfer system.

## [Effect of the Invention]

As described above, according to the present invention, the data transfer channel is switched only when a telephone call is made using the transfer line. Therefore, data

## SHUSAKU YAMAMOTO

Appln. 2000-516470

Your Reference: 081513-31

transfer can be performed at a frequency having little loss on the transfer line in the normal operation. Thus, the present invention provides an information transfer system capable of simultaneously performing highly stable data transfer and a telephone call.

#### 4. Brief Description of the Drawings

Figure 1 is a block diagram showing a conventional information transfer system; and Figure 2 is a block diagram showing an information transfer system according to an example of the present invention.

A ... line connection circuit; B ... modulation and demodulation circuit, C ... input/output circuit; D ... calling circuit; E ... calling/switching circuit; 1 ... divider; 2 ... hybrid circuit; 3 ... amplifier for receiving; 4 ... band pass filter for receiving; 5 ... demodulator; 6 ... amplifier for transmitting; 7 ... band pass filter for transmitting; 8 ... modulator; 9, 10 ... low pass filter for telephone calls; 11 ... amplifier for calling; 12 ... speaker for calling; 13 ... transmitter/receiver; 14 ... band pass filter for receiving; 15 ... demodulator; 17 ... band pass filter for transmitting; 18 ... modulator; 21 ... transmitting channel switching relay; 23 ... carrier detection relay for calling.

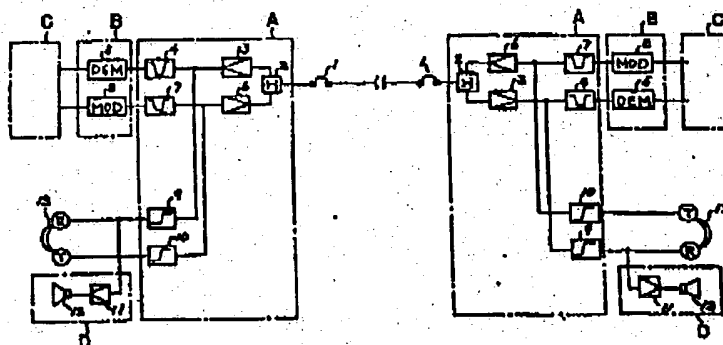
In the figures, identical reference numerals represent identical or corresponding elements.

## SHUSAKU YAMAMOTO

Appln. 2000-516470

Your Reference: 081513-31

{ Fig. 1 }



{ Fig. 2 }

